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CUSTOMER NO. 35811

Art Unit: 1772
Examiner: Patterson, Mark A.
Serial No.: 10/684,356
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Inventors: David E. Rhodes, et al
Title: ACTIVATABLE ADHESIVE WEB AND ARTICLES MADE THEREFROM

Docket No: SON-05-1376R

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Dated: August 18, 2006

DECLARATION OF ARNOLD B. FLOYD, JR. UNDER 37 C.F.R. 1.132

I, Arnold B. Floyd, Jr., hereby declare as follows:

1. I am a co-inventor of the subject matter claimed in the above referenced application.

2. I have worked in the adhesives industry for 45 years. My experience includes work with sodium silicate adhesives, urea-formaldehyde resins, microwave activation of adhesives and fibrous substrates.

3. I have performed certain experiments relating to the activation of various adhesives using microwave energy. Exemplary results from these experiments are shown in the chart below. Other tests were performed using other adhesive combinations and varying durations and application thicknesses. The results provided are exemplary of the discovery of sugar as a dielectric reducing agent. Prior to performing these tests, I was unaware of the dielectric properties of sugar.

The test procedure involved 1" x 1" squares of paper substrate were adhered to each other by placing various adhesives on each adjacent face of the squares and pressing the squares together. Two types of adhesives were used. These tests were performed using a 42 weight Mayer rod to apply the adhesive to the substrates.

i. Two sets of squares were adhered together using only sodium silicate. These samples are denoted by the letters A and B in the chart below.

ii. Two squares were adhered to each other using a mixture of 90% sodium silicate and 10% sugar. These samples are denoted by the Samples C and D in the chart below.

iii. The squares were then placed in a 1200-watt microwave under full power.

-One set of squares using only silicate adhesive, and one set of squares using sodium silicate adhesive and sugar, were placed in the microwave for a duration of two minutes. These samples are denoted by the letters A and C respectively.

-One set of squares using only sodium silicate adhesives and one set of squares using 90% sodium silicate and 10% sugar were placed in the microwave for a duration of one minute. These samples are denoted by the letters B and D, respectively.

The results of this testing are as follows:

	Adhesive	**Duration**	**Power**	**Result**
A	100% Silicate	2 Minutes	1200 Watts	10% tear strength
B	100% Silicate	1 Minutes	1200 Watts	0% tear strength
C	90% Silicate w/ 10% Sugar	2 Minutes	1200 Watts	100% tear strength
D	90% Silicate w/ 10% Sugar	1 Minutes	1200 Watts	100% tear strength

4. In the results column, sample C and D have a strength of 100%, meaning that the adhesive was completely bonded to the paper forcing internal failure of the paper before failure of the adhesive bond. Sample B has a 0% tear strength, which indicates that the adhesive bond failed before the paper failed internally. The 10% tear strength of sample A indicates that 10% of the surface area of the paper failed before the adhesive, while the adhesive failed across 90% of the surface area.

5. The testing described above shows that in both cases where only sodium silicate adhesives were used, the result was 0% - 10% tear strength between the two squares of paper. The poor adhesion results from scorching, which is an overheating of the paper. In cases where 90% sodium silicate adhesive and 10% sugar were used, there is a 100% tear strength between the two substrates. Thus, by using a dielectric reducing agent, in this case sugar, we were able to extend the amount of time that the adhesive could be exposed to microwaves, the activation window, without scorching. Extending the activation window of silicate adhesive gives more control over the activation process and thus provides an improved adhesion.

6. In forming articles from fibrous substrates, in accordance with the application, sodium silicate adhesive containing a dielectric reducing agent is applied to a fibrous substrate and dried. During the forming process, the substrate holding the adhesive is exposed to microwave energy. The latent water in the substrate is heated and driven into (or towards) the adhesive, solubilizing the adhesive, which actives the adhesive. The dielectric reducing agent reduces the ability of the adhesive itself to absorb microwave energy. Without the reducing agent, the adhesive gets too hot in the presence of microwave energy. The reducing agent keeps the temperature of the adhesive down during activation and prevents scorching. The microwave energy is thus primarily absorbed by the fibrous substrate. In the present invention, the heated moisture solubilizes the sodium silicate, dissolving the silicate into an activated tacky state. Upon activation, the adhesive bonds to the adjacent webs.

7. I have read and understand US 2,922,729 to Dereich. Dereich teaches a silicate adhesive containing a sugar modified urea formaldehyde resin. The adhesive in Dereich is described as providing improved water resistance and low adhesiveness to metal surfaces. Through my experience in the adhesive industry, I have come to know that silicate adhesive gains water resistance with time. However, sugar is highly soluble and has poor water resistant qualities. Thus, in Dereich, it is not the sugar that creates water resistance. It is the silicate itself that is water resistant.

8. I have read and understand US 3,748,204 to Murayama et al. Murayama teaches lamination of paper by bonding thermoplastic resins to the paper using microwave energy. Specifically, Murayama teaches the heating of the latent water in the paper to melt or soften the thermoplastic resins so that they become engrained in the fibers of the paper. To the extent that adhesives are used in Murayama, they are not activated by the microwave energy or by migration of water from the paper. During microwave application, the adhesives used in Murayama serve as additional heat generators, by absorbing microwave energy, further serving to melt the thermoplastic resins to the paper substrate. The water does not activate or solubilize the polymer; rather the heat melts the polymer. The addition of sugar or a dielectric

agent in this structure would not slow the heating process or otherwise alter the formation of the laminate.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

8-18-06
Date

Arnold B. Floyd Jr.
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